

Z'(120)->qq and jet cone size

Low luminosity ($2 \cdot 10^{33}$) pp events with qq->Z'-> qq. Initial and final state radiation turned on.

$$|\text{eta}(q1)| < 1.5, |\text{eta}(q2)| < 1.5.$$

Jets are found with iterative cone algorithm using different cone sizes (R=0.5, 0.7, 0.9 on particle level and R=0.3, 0.4, 0.5, 0.6, 0.7, 0.8, 0.9, 1.0, 1.1 on calorimeter level).

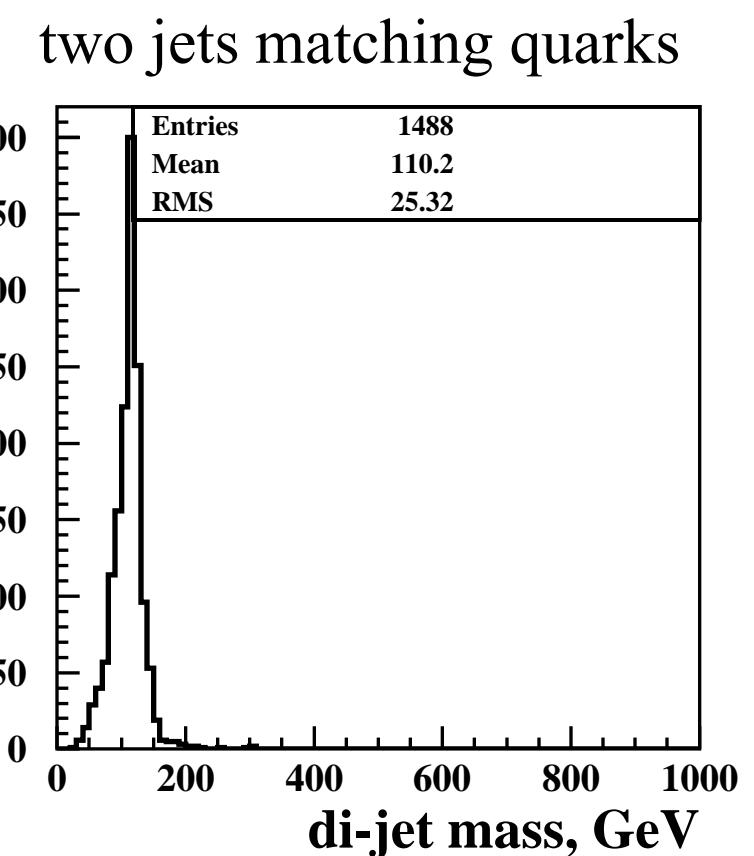
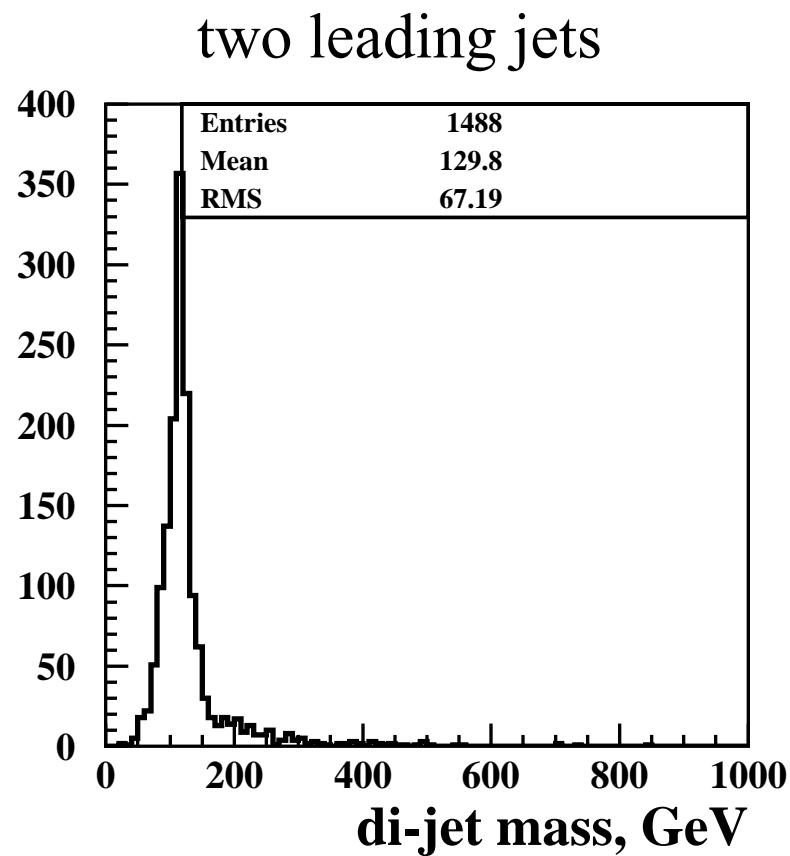
Seed threshold 2 GeV

Jet threshold 10 GeV.

To reconstruct Z' mass using any of the algorithms I apply a single cut:

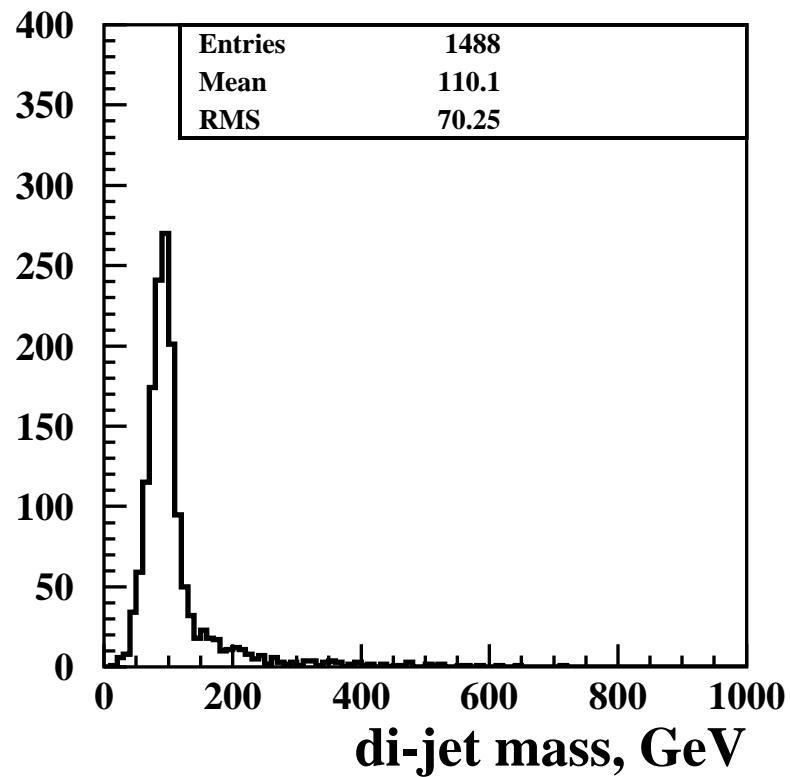
At least two jets with $\text{ET} > 10 \text{ GeV}$ are required to be found for all the cone sizes mentioned above. Thus I use exactly the same event sample to reconstruct Z' mass using different cone sizes.

Di-jet mass at the particle level (R=0.5, no pile-up)

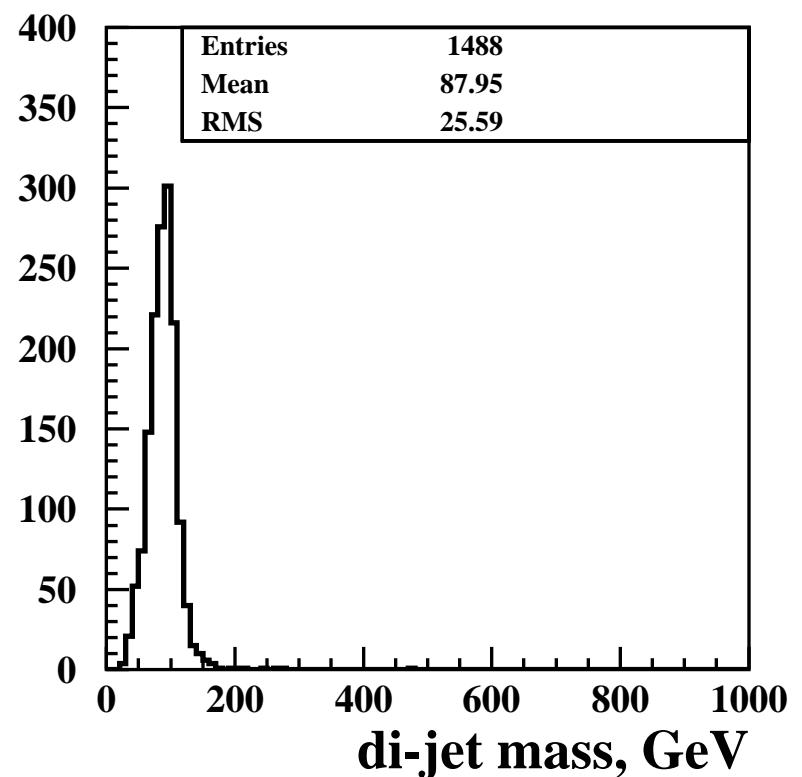


Di-jet mass at the calorimeter level (R=0.5, low luminosity)

two leading jets



two jets matching quarks

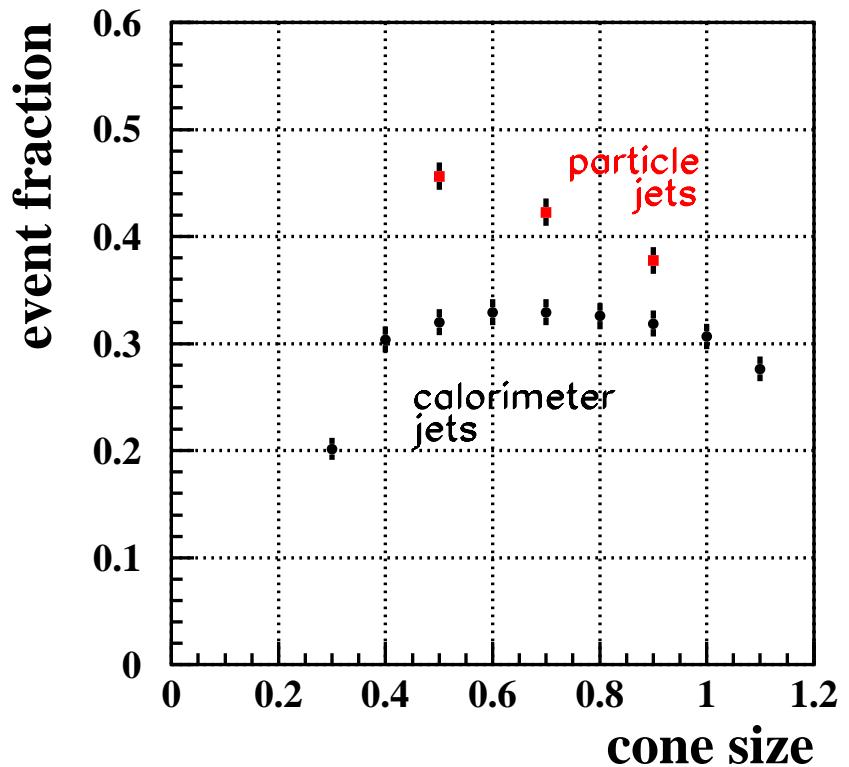
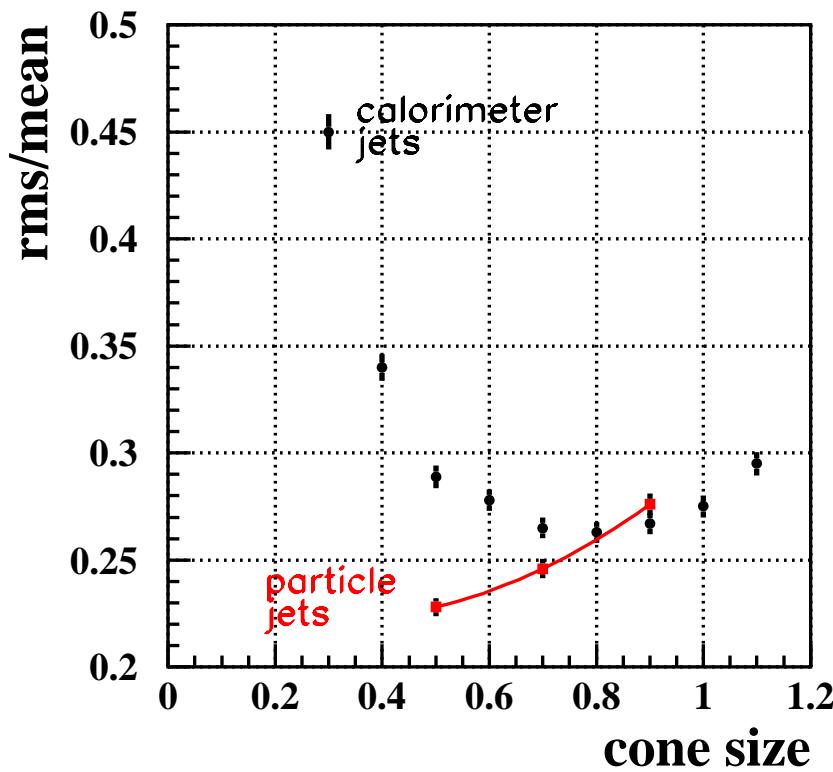


Di-jet mass distribution is not gaussian, so I try two methods to compare Z' mass reconstruction performance with different jet cone sizes:

1. Find the jets closest to initial quarks from Z' decay and take the RMS/MEAN of the di-jet mass distribution of the quark-matching jets as a measure of the resolution;
2. Plot the di-jet mass distribution of the two highest ET jets and count the fraction of events lying within 10% region around the peak.

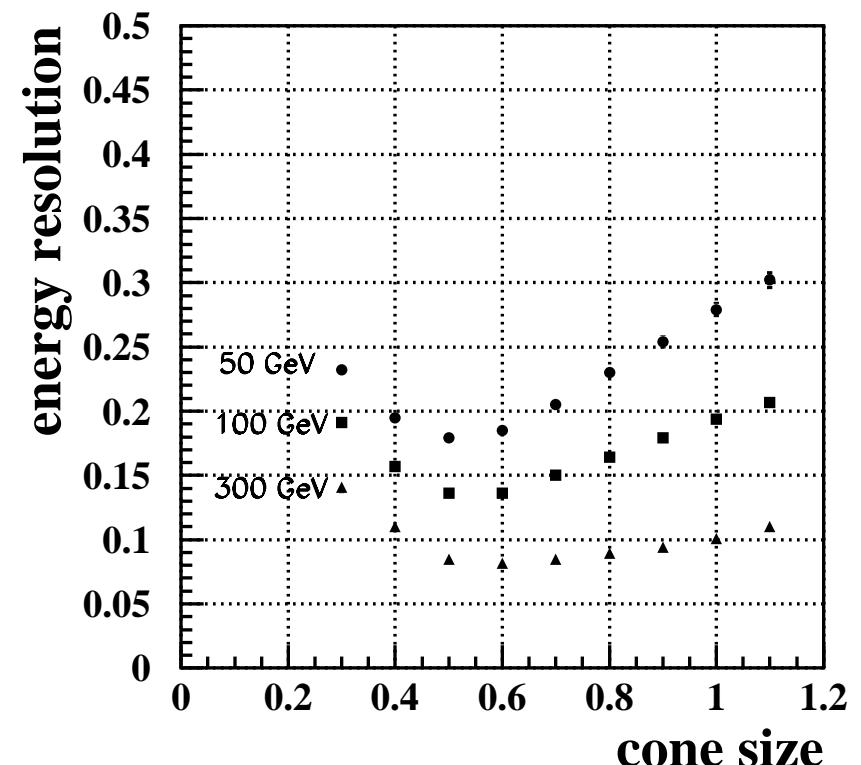
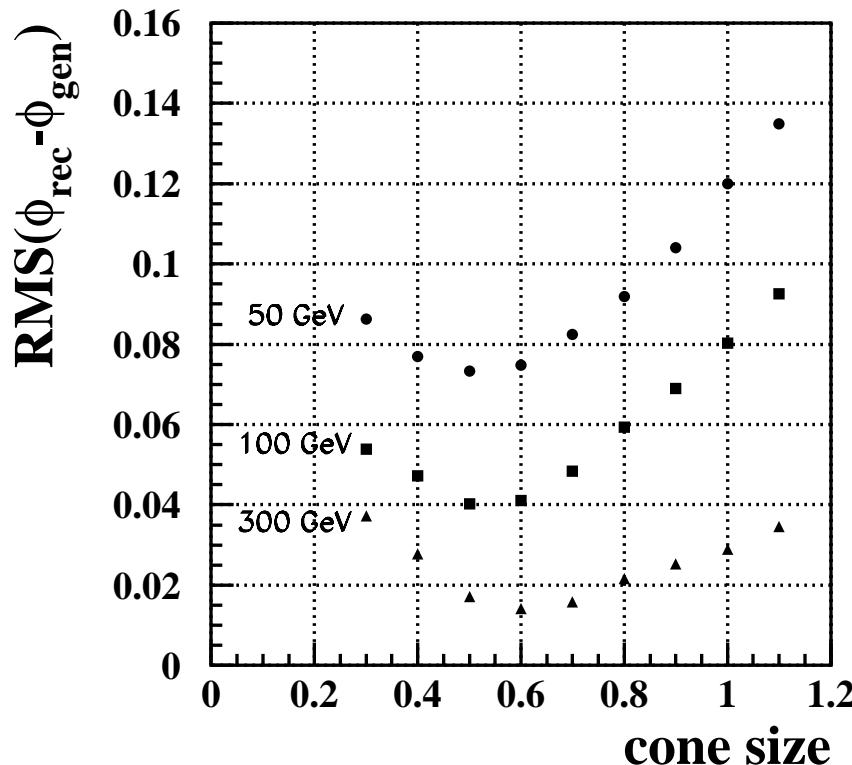
Z' mass reconstruction performance

no jet energy corrections



Do these results agree with single jet resolutions?

Resolutions for single jets found with cone size R=0.5 at the particle level and different reconstruction cone sizes



Need to apply jet corrections for di-jet mass reconstruction?